Labor Market Conditions-Female Labor Supply Nexus: The Role of Globalization in Pakistan

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Abstract
This study examines the impact of female wages, unemployment, foreign remittances and globalization on female labor supply over the period from 1980 to 2010. We have applied the ARDL bounds testing to test whether cointegration exists between variables. Our results show that variables are integrated for long run relationship. Moreover, female wages attract female labor supply. Foreign remittances and globalization raises female labor supply but unemployment declines it. The relation between female wages and female labor supply is U-shaped. The causality analysis reveals that female wage, foreign remittances, globalization and unemployment Granger cause female labor supply.
Keywords: Labor Market Condition, Globalization, Female Labor Supply, Pakistan

I. Introduction

The dynamics of labor market is said to be the main route for establishing the nexus among macroeconomic policies, economic growth and poverty alleviation. A plethora of studies on the labor market conditions in Pakistan have focused on economic activity, percentage of employed persons, unemployment rate, wage differentials, female working hours, poverty, gender development and gender empowerment (Chaudhary and Khan, 1987; Arif, 2002; Sabir et al. 2007; Amad et al. 2007; Afzal, 2006; Ejaz, 2011 and Abbas, 2013). These are identified as important determinants of gender wellbeing since these determinants are interdependent on each other and one leads to another. For the last six and half decades, Pakistan has been experiencing different dimensions in growth performance with a wide variety of labor market outcomes. Pakistan adopted different polices in different periods, such as Import Substitution Strategy, Trade Liberalization Policy, Structural Adjustment and Stabilization Program etc. The government took various measures in different phases, under the recommendations of World Bank and IMF, to decrease fiscal deficit, reduce subsidies on agricultural production, austerity measures, cut down expenditures in social sectors like health and education, restructure tax structure such as general sales tax, income tax, corporate tax, increased user charges etc. These measures raise the cost of living along with a reduction in real income in the household. The outcome of this is reflected in a number of undesirable effects in terms of less-feed women. Pakistan is a patriarchal society where women are considered to be less privileged and least important member of family. A decline in household real income means less food to be available to the household and among all the family members as in our traditional setup food is first serve to the male members then sons and then daughters and in the end females. The females are denied of their basic rights in terms of health facilities, education and an increase in working hours for social reproductive work. With the introduction of Structural Adjustment Policies and Programs, the price in market rises with the squeeze of income, which increases unemployment rate and reduces wages for men. In short, urban poor, working class women are the most affectees as they are the "shock absorbers" of Neo-liberal economic policies. Moreover, privatization and technology advancements affect females' participation negatively (Streeten, 1999). The Stabilization and Structural Adjustment (SSA) programs of 1987-92 reflect that income inequalities had increased due to the reduction in employment opportunities and a regressive tax structure (Kemal, 1994).

Among the South Asian countries Pakistan has the lowest participation of female labor force[1]. It has been observed with great concern that the gap between female and male labor force participation and employment is mostly due to educational gaps in the form of literacy, enrollment and average year of schooling between females and males. For instance, in 2001, female literacy as percentage of male literacy was 50% in Pakistan, 67% in India, 94% in Sri Lanka. Likewise, in 2000 the female and male unemployment ratio was 3.5% which implies women are 3.5 time more likely than men to be unemployed while in India for the same year women are 1.4 time more likely to be unemployed. In case of Pakistan, the unemployment rate of female is 14.9% in 2000, which has decreased to 8.9% in 2011. This shows a decrease in the female male unemployed ratio which is 1.74% in 2011 showing a decline in the unemployment rate.

In Pakistan, labor force participation is very low due to lack of opportunities and capabilities. This includes rigid gender roles, ideologies, social stigma, cultural restrictions especially on female mobility, segmented labor markets, lack of education and skills, family responsibilities and gender biases that show a low value of female labor due to the social reproductive work. The total labor force participation is 32.8% in 2010-11 which is almost equal to the rate that is 33% in 2009-10. In case of rural-urban, the participation of females in the urban areas is 30% in 2010-11 and 2009-10 while in the case of rural areas the participation trends shows a slight change 34.3% to 34.5 % in 2009-10 and 2010-11[2]. Despite rapid industrialization, urban-female participation rate derived from official labor force survey data shows a negligible increase over the past two decades, rising from 5% in 1987-88 to 21.7% in 2010-11 showing the refined activity rate. In Pakistan, unemployment rate for

[1] LFPR

[2]The labor force participation by both the gender is positively associated with the level of education. In Pakistan, the wage structure is not significantly different from the other neighboring countries. Wage differentials exist due to personal characteristics, labor market segregation, division and specialization of labor as well as the structure of wages. In Pakistan, which is a conventional society and males are in the dominant position, the males command a larger bargaining power due to personal characteristics while females are mostly taken as granted and so their work and personal characteristics. Generally, the wage rate is higher in tertiary activities followed by secondary and primary activities as there is a positive relationship between wage rate and the kind of element of white collar jobs in an occupation. If the occupation is muscular, it reflects high paid assignments and more pronounced for males as compared to females. Females are mostly occupied in low paid clerical jobs. However, there have been the conventional occupations for females which are confined to professions like teaching and medicine, apart for the agriculture sector. Even in the current scenario, majority of women are at a serious disadvantage in the labor market and the participation in the modern high productivity sectors of the economy has not increased during the course of development.

females is higher than for males. Most of the people are engaged in some sort of market or economic activities, irrespective of the considerations of the wage rate, working age and working hours[3].

This paper contributes in existing economic literature by investigating the impact of labor market conditions on labor force participation. We have extended labor force participation function by incorporating foreign remittances and globalization as potential determinants of female labor force participation and hence economic growth. We have applied structural break unit root test in order to examine the stationary properties of the variables. The ARDL bounds testing approach is employed to test the existence of long run relationship between the variables. The causal relationship between the variables is tested by applying the VECM Granger causality approach. We find that the variables are cointegrated for long run relationship. The impact of female wage on female labor force participation is positive. Foreign remittances also add in female labor force participation. The relationship between globalization and female labor force participation is positive. Unemployment is inversely linked with female labor force participation. The inverted U-shaped relationship between female wage and female labor force participation is existed. The causality analysis reveals the unidirectional causality running from female wage and globalization to female labor force participation. The feedback effect is found between unemployment and female labor force participation.

The rest of paper is organized as following: section-II presents the review of literature. analytical framework, methodological framework and data collection are described in section-III. Section-IV reports results and their discussion. Conclusion and policy implications are drawn in section-V.

II. Literature Review

A body of literature has studied wages, employment, and unemployment rate, globalization and female labor force participation. For example, Guy Standing, (1989) has hypothesized "Feminization of employment" because of increasing globalization of production searching

[3]Thus, unemployment rate estimated is lower than perceived. The total unemployment rate in Pakistan is 6% in 2010-11 which is higher as compared to last year figure of 5.6%.

for flexible forms of labor to retain or increase competitiveness along with the job structures in industrial enterprises. There are two propositions with the global economy, (i) that it increases the number of women in the labor force and (ii) that it has deteriorated the working conditions in terms of labor standards, income and employment status. The author stresses on the dual characteristics of feminization which increases the participation of female labor force on one hand, and decreases the labor standards, employment and earnings on the other. Brown, (1992) highlights employment as the main indicator in influencing women empowerment and reports that economic reforms may bring improvement as more females get associated with the productive and market activities they become more empowered and thus in itself alleviates domestic violence. Basu et al. (1998) emphasize the theoretical consequences of added worker effect. It leads to give rise to multiple equilibriums. The authors are of the view that unemployment benefits can neutralize or mollified the inefficiencies caused by the potential of households to over supply labor. An increase in unemployment leads to an increase in labor supply and leads to "added worker effect". The authors assume that unemployment leads to increasing women and children in the supply of labor force. Unemployment of the primary worker pushes the secondary worker to seek work i.e., what is known the "added worker effect" and its opposing force is the "discouragement effect". It reflects that the potential workers abandon their hopes and are being discouraged.

A voluminous study in empirical research in this area highlights that discouragement effect dominates the added worker effect and mostly offsets entirely the added worker effect (Layard et al.1980; Maloney, 1991). It is worth noting that the female's employment may be affected by the husband's unemployment or employment obstacles faced by the male's labor supply. Drinkwater et al. (2003) employ aggregate data for 20 countries, and develop Labor Matching Model for the years between 1996 and 2000 and identify the specific countries where remittances were at least 1% of GDP between 1996 and 2000. The nexus between remittances and unemployment is tested by employing data from a panel of developing countries. They postulate that higher unemployment rates are due to remittances as it is taken as welfare payments. However, income in the form of remittances has a non-significant effect on unemployment. The author is of the opinion that if "the investment effect" offsets the "search income effect" then remittances have the potential to contract the unemployment rate.

Amuedo-Dorantes and Pozo, (2005) examine the relationship between foreign remittances and unemployment and found no significant evidence between remittance inflows and the decrease in unemployment rate. Funkhouser, (2006) uses longitudinal data from living standard measurement service for the period 1998-2001, in Nicaragua and finds the significant of migration and remittances on labor supply. Canales, (2007) employs data from ENIGH 2002 to maintain the argument that remittances compensate households for lower Mexico-based earn wages. The author has identified four ways through which remittances can improve the well-being of the migrant's families and promote economic development in the country. The authors found that in 70% of the cases remittances are used mainly for food consumption, 21% of the amount is spent to buy and renovate a house or a buy a car. The author is of the opinion that the remittance is like an injection of economic resources into particular sectors of the economy. A very small chunk of these flows are productively invested or saved. Gillani et al. (1981) have compared the data related to migrants and remittances in a series of research reports specifically on labor migration of Pakistan to the Middle East and its impact on Pakistan's economy. They empirically testify that migration provides an opportunity to earn 5 to 8 times more on the average in the Middle East labor market than in the home county i.e. Pakistan. Chaudhary and Khan, (1987) investigated the determinants of female labor supply in rural Pakistan and noted that wage-gap, education and customs play important role in supply of female labor. Arif et al. (2002) has explored the labor market dynamics in Pakistan by using the longitudinal data set. They have employed two rounds of Pakistan Socio-Economic Survey (PSES) to identify the movement of individuals into and out of labor market and labor force, employment and unemployment. This study has divided the sample into three labor market status i.e. employed, unemployed and not in the labor force. They observe that the labor force participation rate for the adult population increases from 44% in 1998-99 to 48% in 2000-01. This increase in labor force participation is partly because of increase in the labor force participation. It was also investigated and explored that unemployment rate had increased from 6.4% in 1998-99 to 11.5% in 2000-01. Their analysis reveals that education has a negative impact on making transition from labor force to outside the labor market.

Sabir and Aftab (2007) explored the gender wage gap in Pakistan by using data from the labor force survey at two different points in time- i.e. 1996-97 and then after a decade in 2005-06. They have investigated the gender wage gap; duly respect to disaggregate by

occupation and province-wise. They find that the decline in unequal treatment of both men and women shows an important puller for the increase in the gender pay gap in the lower-middle part of the conditional wage distribution. Faridi and Basit, (2011) probed the factors affecting rural labor supply by applying binomial logit regression. They claimed that education, economic and social capital have positive impact on rural labor supply but livestock and landholdings decline it. Ejaz, (2011) also examined the impact of determinants on female labor supply and found that gender-wage gap and fertility impede female labor supply while ownership of home appliances and co-residence increase it. Soomro et al. (2012) evaluated the implications of economic globalization on the unemployed and on labor force participation in of Pakistan i.e. at national and international levels. Their findings revealed that in Pakistan, there exists a significant positive effect of economic globalization on unemployment. Recently, Abbas (2013) investigated the determinants of female labor supply using data of Bangladesh and Pakistan. The U-shaped relationship exists between economic development and female labor supply. Infant mortality rate affects female labor supply more in Pakistan and education impacts female labor supply more in Bangladesh.

The exiting literature review reveals that there is no study investigating the impact of labor market conditions on female labor supply in case of Pakistan. This study is pioneering effort to fill gap in case of Pakistan.

III. Analytical Framework, Methodological Framework and Data Collection

The human capital theory of wage determination advocates that wages are tied to productivity and in a non-discriminatory atmosphere which is evident in terms of differences in productivity of both the gender. The key variable influencing the FLFP is wages (either male or female). However, household income will be inversely related to women's entry in the labor market as the lower income of a male member the higher the probability of a woman entering in the labor market and vice versa. Economic theory also posits that the effect of wages on labor force participation depends on the relative strengths of substitution and income effects. The substitution effect will be positive since higher wages will mean more labor force participation. The income effect will be negative since as income raises workers desire for more leisure and less work. Assuming that the income effect is small, the overall effect of wages on labor force participation will be positive. The effect of male wage may also be negative on FLFP as higher wages of male suppressed female participation in labor

force by restricting them to home. Remittances depict an income flow from the other part of the world to the parent country. It has a lot of positive impacts at the household level as well as at the economy. However, it has been noted that the pattern and trend in the use of remittances by the immigrant families reduces its effectiveness for economic development as it is believed that a substantial part of the remittances is mostly spent on the current consumption like consumable and durable commodities, unproductive investments such as real estate residential, house, etc. It has been observed that as the family income increases due to inflow of remittances, it reduces the participation of females in the labor market.

One important aspect is globalization, which has turned the world into a global village. The impact of globalization and openness to trade on women has been mixed in the different countries of world. One important aspect of economic globalization is the creation of job opportunities for both men and women and especially for females, as globalization promotes export processing zone, free trade zones and world market factories. Moghadam (1999), in the current global environment of open economies, new trade requires and competitive export industries, global accumulation rates rely heavily on the work of women, both waged and unwaged, in formal sectors in the home, in manufacturing and in public and private services. This phenomenon has been termed as the "feminization of labor". Guystanding (1989) has hypothesized that the increasing globalization of production and the pursuit of flexible forces of labor to retain or increase competitiveness, as well as increasing job structures in industrial enterprises, favor the "Feminization of employment" in the dual sense of an increase in the number of women in the labor force and a deterioration of working conditions in terms of labor standards, income and employment status. On one hand, women are gaining in terms of jobs availability but are at disadvantage position in the new labor markets in terms of training, wages and occupational segregation. As they are mostly involved in temporary, part-time, casual and home based work.

The most important factor determining the FLFP is unemployment rate of both the male and female. The unemployment rate, which best describes the local labor market conditions. The female unemployment rate affects the probability that women entering the labor market will find a job. While on the other hand, the economic and psychological cost associated with searching of job is very high when the female unemployment rate is high. Due to the above reasons, women may be discouraged to look for job. However, when the male member of the

family becomes unemployed there are more chances of women entering the labor market to compensate the loss of family income. Hence, it is expected that FLFP increases with an increase in unemployment rate of the male as the family income declines while decreases with the increase in the overall unemployment rate or the female own unemployment rate.

For empirical purpose, we have converted all series except unemployment rate into logarithm. The logarithm form of the variables reduces the sharpness in time series data. The empirical equation of the model is as follow:

$$\ln FP_t = \alpha_1 + \alpha_2 \ln W_t + \alpha_3 \ln R_{t-1} + \alpha_4 \ln G_t + \alpha_5 U_t + \varepsilon_t \qquad (1)$$

where ln shows natural logarithm, FP_t indicates female labor force participation per capita, W_t is female wages, R_t denotes foreign remittances per capita, G_t is for globalization proxies by the KOF index of globalization, U_t illustrates unemployment rate and ε_t is residual term assumed to be normal distributed. The unrestricted error correction model (UECM) of autoregressive distributive lag modelling (ARDL) bounds testing is modeled as follows:

$$\begin{aligned}\Delta \ln FP_t = {} & \vartheta_1 + \vartheta_T T + \vartheta_W \ln W_{t-1} + \vartheta_R \ln R_t + \vartheta_G \ln G_{t-1} + \vartheta_U U_{t-1} + \sum_{j=1}^{q} \vartheta_j \Delta \ln FP_{t-j} + \sum_{k=0}^{r} \vartheta_k \Delta \ln W_{t-k} \\ & + \sum_{l=0}^{s} \vartheta_l \Delta \ln R_{t-i} + \sum_{m=0}^{t} \vartheta_m \Delta \ln G_{t-m} + \sum_{n=0}^{u} \vartheta_n \Delta U_{t-n} + \varepsilon_i \end{aligned} \qquad (2)$$

Where difference operator is indicated by Δ, T is trend variable and ε is residual term assumed to have normal distribution with finite variance and zero mean. Next step is to compute the ARDL F-statistic to examine whether co-integration between the variables exists or not. Appropriate lag order of is necessary to choose because value of F-statistic varies with lag order. We use Akaike Information Criteria (AIC) to choose suitable lag length. We apply F-test developed by Pesaran et al. (2001) to examine the joint significance of estimates of lagged level of the series. The null hypothesis of no co-integration is $H_0 : \vartheta_{FP} = \vartheta_W = \vartheta_R = \vartheta_G = \vartheta_U = 0$ and hypothesis of co-integration is $H_a : \vartheta_{FP} \neq \vartheta_W \neq \vartheta_R \neq \vartheta_G \neq \vartheta_U \neq 0$. Two asymptotic such as upper critical bound (UCB) and lower critical bound (LCB) have

been generated by Pesaran et al. (2001). We accept the hypothesis of co-integration if computed F-statistic is more than upper critical bound. The hypothesis of cointegration is rejected once lower critical bound is more than our computed F-statistic. We cannot make decision about cointegration if computed F-statistic is between upper and lower critical bounds. We utilize critical bounds developed by Narayan (2005) because these are suitable for small sample i.e. T = 30 to T = 80. It is pointed by Narayan (2005) that critical bounds provided by Pesaranet al. (2001) are downwards and may produce misleading results. The diagnostic tests have also been conducted to test the problem of normality, serial correlation, autoregressive conditional heteroskedasticity, white heteroskedasticity and specification of the ARDL bound testing model.

Once long run relationship between labor market conditions and female labor force participation is established, it is necessary to find short run impact of labor market conditions on female labor force participation in case of Pakistan. In doing so, we apply error correction method (ECM). The empirical equation of ECM is modeled as follows,

$$\Delta \ln FP_t = \delta_{\circ 1} + \sum_{i=1}^{l} \delta_{FP} \Delta \ln FP_{t-i} + \sum_{j=0}^{m} \delta_W \Delta \ln W_{t-j} + \sum_{k=0}^{n} \delta_R \Delta \ln R_{t-k} + \sum_{l=0}^{o} \delta \Delta \ln G_{t-l} + \sum_{m=0}^{p} \delta_U \Delta \ln U_{t-m} + \vartheta ECM_{t-1} + \varepsilon_i \quad (3)$$

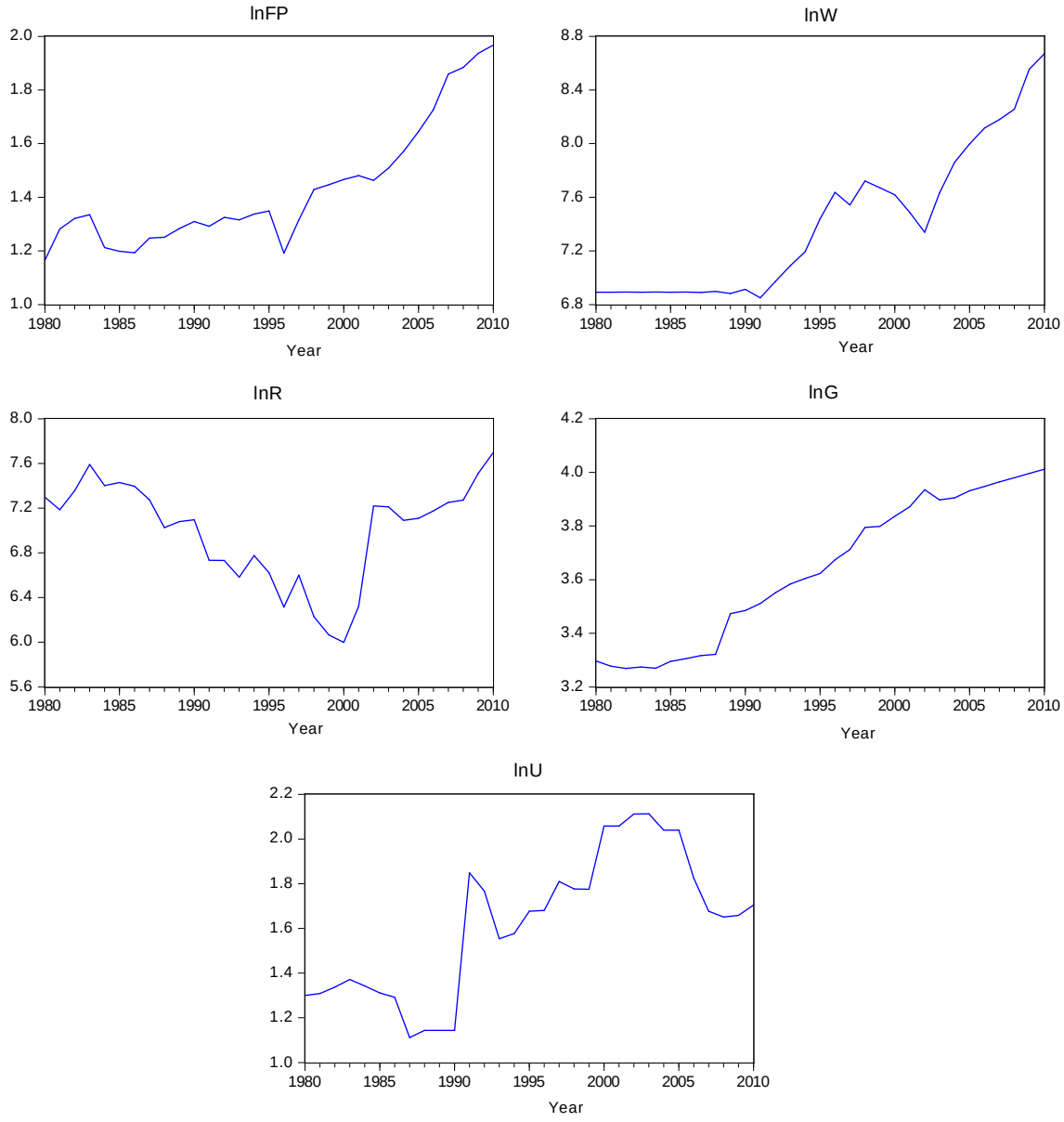
Where ECM_{t-1} is lagged error term. ϑ is estimate of lagged error term captures the speed of adjustment from short run towards long run equilibrium path. Here, we say that differenced of female labor force participation is explained by differenced of linear (non-linear) term of real GDP per capita plus lagged error term and stochastic term. We have conducted diagnostic tests to test the Classical Linear Regression Model (CLRM) assumptions such as normality of error term, serial correlation, autoregressive conditional heteroskedasticity, white heteroskedasticity and specification of short model. The reliability of short run estimates is investigated by applying the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMsq) suggested by Pesaran and Shin, (1999).

We should apply the vector error correction model (VECM) to investigate causal relationship between the variables once cointegration relationship exists between the series. It is argued by Granger, (1969) that the VECM is an appropriate approach to examine causality between the variables when series are integrated at I(1). The empirical equation of the VECM Granger causality approach is modeled as follow:

$$(1-L)\begin{bmatrix}\ln FP_t\\ \ln W_t\\ \ln R_t\\ \ln G_t\\ U_t\end{bmatrix}=\begin{bmatrix}a_1\\ a_2\\ a_3\\ a_4\\ a_5\end{bmatrix}+\sum_{i=1}^{p}(1-L)\begin{bmatrix}b_{11i}b_{12i}b_{13i}b_{14i}b_{15i}\\ b_{21i}b_{22i}b_{23i}b_{24i}b_{25i}\\ b_{31i}b_{32i}b_{33i}b_{34i}b_{35i}\\ b_{41i}b_{42i}b_{43i}b_{44i}b_{45i}\\ b_{51i}b_{52i}b_{53i}b_{54i}b_{55i}\end{bmatrix}\times\begin{bmatrix}\ln FP_{t-1}\\ \ln W_{t-1}\\ \ln R_{t-1}\\ \ln G_{t-1}\\ U_{t-1}\end{bmatrix}+\begin{bmatrix}\alpha\\ \beta\\ \delta\\ \phi\\ \varphi\end{bmatrix}ECT_{t-1}+\begin{bmatrix}\varepsilon_{1t}\\ \varepsilon_{2t}\\ \varepsilon_{3t}\\ \varepsilon_{4t}\\ \varepsilon_{5t}\end{bmatrix} \quad (4)$$

Where $(1-L)$ indicates difference operator and lagged residual term is indicated by ECT_{t-1}, which is obtained from long run relationship while $\varepsilon_{1t},\varepsilon_{2t},\varepsilon_{3t},\varepsilon_{4t}$, and ε_{5t} are error terms. These terms are supposed to be homoscedastic i.e. constant variance. The statistical significance of coefficient of lagged error term i.e. ECT_{t-1} using t-statistic shows long run causal relationship between the variables. The short run causality is shown by statistical significance of F-statistic using Wald-test by incorporating differenced and lagged differenced of independent variables in the model. Moreover, joint significance of lagged error term with differenced and lagged differences of independent variables provides joint long-and-short runs causality. For example, $b_{12,i}\neq 0\forall_i$ implies that female labor wage Granger-causes female labor supply and female labor wages is Granger-caused by female labor supply shown by $b_{21,i}\neq 0\forall_i$.

Figure-1: Trends of Variables



The study covers the period of 1980-2010. We have combed Economic Survey of Pakistan (various issues) to collect data on female labor force participation, female nominal wages and unemployed rate. The world development indicators (CD-ROM, 2012) has been used to collect data on real foreign remittances. The population series is engaged to convert all the variables into per capita units (except unemployment rate). We have used KOF index of globalization. All the variables transformed into log-linear specification (except unemployment rate) to attain consistent empirical results.

IV. Results and their Discussions

Table-1 and 2 report the descriptive statistics and correlation matrix. Our empirical exercise indicates that the variables such female wage, international remittances, globalization and unemployment rate have normal distribution as shown by Jarque-Bera statistics except for female labor supply. The correlation matrix reveals that a positive and strong correlation exists between female labor supply and female wage. The correlation of international remittances and globalization with female labor supply is positive (the coefficient of correlation between globalization and female labor supply is also strong). Surprisingly, unemployment rate and female labor supply are related positively. The association of remittances, globalization and unemployment rate with female wage is positive. There is negative correlation between globalization and international remittances, and same inference is drawn for unemployment rate and international remittances. A positive association is also found between unemployment rate and globalization.

Table-1: Descriptive Statistics

Variables	$\ln FP_t$	$\ln W_t$	$\ln R_t$	$\ln G_t$	U_t
Mean	1.4293	7.4082	6.9885	3.6360	1.6196
Median	1.3353	7.3384	7.1097	3.6225	1.6770
Maximum	1.9675	8.6692	7.6968	4.0114	2.1126
Minimum	1.1656	6.8504	5.9984	3.2691	1.1118
Std. Dev.	0.2309	0.5531	0.4577	0.2715	0.3164
Skewness	1.1060	0.7040	-0.6674	-0.0922	-0.0475
Kurtosis	3.1213	2.3838	2.4384	1.4796	1.8455
Jarque-Bera	6.3398	3.0513	2.7089	3.0297	1.7332
Probability	0.0420	0.2174	0.2580	0.2198	0.4203
Observations	31	31	31	31	31

Table-2: Correlation Matrix

Variables	$\ln FP_t$	$\ln W_t$	$\ln R_t$	$\ln G_t$	U_t
$\ln FP_t$	1.0000				
$\ln W_t$	0.9149	1.0000			

$\ln R_t$	0.2226	0.0019	1.0000		
$\ln G_t$	0.8270	0.8976	-0.2158	1.0000	
U_t	0.4704	0.5787	-0.4090	0.8001	1.0000

We have applied battery of unit root tests to ensure that we are not going to disturb the fundamental assumption of the ARDL bounds testing approach to cointegration. The assumption of the ARDL bounds testing is that the variables should be integrated at or I(1) or I(0) or I(0) / I(1). Testing the unit root properties of the variables avoids the problem of biasness of empirical results. In doing so, we have applied all unit root tests step by step to observe the robustness of stationarity properties of the variables. These unit root test are ADF, PP and Ng-Perron unit root tests. The results are reported in Table-3 and 4.

Table-3: ADF and PP Unit Root Tests

Variables	**ADF Unit Root Test**		**PP Unit Root Test**	
	T-Statistic	**Prob. Value**	**T-Statistic**	**Prob. Value**
$\ln FP_t$	-1.3747 (1)	0.8463	-0.8427 (3)	0.9459
$\ln W_t$	-1.9892 (1)	0.7302	-1.3931 (3)	0.8424
$\ln R_t$	-0.9874 (1)	0.9804	-0.8578 (3)	0.9480
$\ln G_t$	-1.9165 (1)	0.6203	-2.5142 (3)	0.3194
U_t	-1.7660 (1)	0.6949	-1.8513 (3)	0.6542
$\Delta \ln FP_t$	-4.8335 (1)*	0.0032	-5.7271 (3)*	0.0004
$\Delta \ln W_t$	-4.3296 (0)*	0.0096	-4.3124 (3)*	0.0099
$\Delta \ln R_t$	-4.1180 (1)**	0.0159	-4.8343 (3)*	0.0029
$\Delta \ln G_t$	-3.6496 (1)**	0.0434	-5.5664 (3)*	0.0005
ΔU_t	-4.0439 (1)**	0.0187	-5.1414 (3)*	0.0014

Table-4: Ng-Perron Unit Root Test

Variables	MZa	MZt	MSB	MPT
$\ln FP_t$	-4.2816 (1)	-1.2598	0.2942	19.4041
$\ln W_t$	-2.7636(0)	-0.9042	0.3272	25.2400
$\ln R_t$	-5.3612 (1)	-1.4629	0.2728	16.399
$\ln G_t$	-9.3081(3)	-2.1169	0.2274	9.9469
U_t	-9.0871 (1)	-2.0451	0.2250	10.3458
$\Delta \ln FP_t$	-34.7297 (2)*	-4.1629	0.1198	2.6465
$\Delta \ln W_t$	-22.3767(2)**	-3.3442	0.1494	4.0761
$\Delta \ln R_t$	-19.9884(1)**	-3.1590	0.1580	4.5725
$\Delta \ln G_t$	-16.3493(5)***	-2.8508	0.1743	5.6226
ΔU_t	-20.9406 (1)**	-3.2318	0.1543	4.3751
Note: *, ** and *** indicate significant at 1%, 5% and 10% levels respectively. Optimal lag order for ADF and bandwidth for PP unit root tests is determined by Schwert (1989) formula.				

Table-3 and 4 deal with the findings of ADF and PP unit root tests while results of Ng-Perron unit root test are reported in Table-5. The results show that the variables are found to be non-stationary at level with intercept and trend. Female labor supply, female wage, international remittances, globalization and unemployment rate are integrated at I(1). The same inference can be drawn about the variables providing by the results of Ng-Perron unit root test. The problem of which is that they are biased because such unit root tests do not have information about structural break occurring in the series showing major events happened in the economy. This issue is solved by applying the Zivot-Andrews (1992) unit root test. The ZA unit root test constrains information about one structural break stemming in the series. The results of Zivot-Andrews unit root test are reported in Table-5.

Table-5: Zivot-Andrews Unit Root Test

Variable	At Level		At 1st Difference	
	T-Statistic	Time Break	T-Statistic	Time Break
$\ln FP_t$	-3.963 (0)	1996	-5.678 (0)*	1997
$\ln W_t$	-2.766 (1)	2001	-5.206 (0)**	1997
$\ln R_t$	-2.470 (1)	2002	-6.112 (1)*	2001
$\ln G_t$	-3.781 (2)	1998	-7.929 (0)*	1989
U_t	-4.149 (0)	2000	-5.795 (2)*	2006
Note: * represents significant at 1% level. Critical T-values are -5.57 and -5.08 at 1% and 5% levels respectively. Lag order is shown in parenthesis.				

Our empirical exercise indicates that variables are non-stationary at level with intercept and trend in the presence of structural break in the series which implies that variables seem to have unique order of integration of the variables. It is our rational to apply the ARDL bound testing approach to cointegration because there is no violation of fundamental assumption of the bounds testing. Table-6 provides us the results of appropriate lag order of the variables by using AIC criterion. Although there are various other criterions, we follow AIC which offers better and consistent results comparatively. The selection of lag length of the variables is prerequisite to apply the ARDL bounds testing to compute F-statistic which is very sensitive with lag length selection (Tiwari and Shahbaz, 2013). Our results indicate that lag 2 is appropriate for the computation of F-statistic to make decision whether cointegration exists between the variables or not.

Table-6: Lag Length Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	32.0063	NA	1.07e-07	-1.8625	-1.6267	-1.7886
1	163.3064	208.2690	7.21e-11	-9.1935	-7.7791*	-8.7505
2	194.3397	38.5241*	5.63e-11*	-9.6096*	-7.0164	-8.7974*
* indicates lag order selected by the criterion LR: Sequential modified LR test statistic (each test at 5% level) FPE: Final prediction error						

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

The results of the ARDL bounds testing approach to cointegration are reported in Table-7. We have used critical bounds generated by Narayan, (2005) which are suited for small data set. Our empirical exercise reveals that our computed F-statistic could not exceed lower critical bound. The results show that there is no cointegration between the variables which negates the existence of long run relationship between the variables. The diagnostic tests show that no serial correlation is found and same inference is drawn about the ARCH. There is existence of homoscedasticity and the model is well specified.

Table-7: The ARDL Co-integration Analysis

Estimated Model	$\ln FP_t = f(\ln W_t, \ln R_t, \ln G_t, U_t)$	
Optimal lag structure	(2, 2, 2, 2, 1)	
F-statistics	2.674	
Significant level	Critical values (T = 31)[#]	
	Lower bounds, $I(0)$	Upper bounds, $I(1)$
1 per cent	7.763	8.922
5 per cent	5.264	6.198
10 per cent	4.214	5.039
R^2	0.8527	
$Adj-R^2$	0.4529	
F-statistics	2.132	
Durbin Watson Test	2.5665	
Diagnostic tests	F-statistics (Prob. value)	
$\chi^2 NORMAL$	3.8900 (0.1429)	
$\chi^2 SERIAL$	1.7290 (0.2365)	
$\chi^2 ARCH$	0.8016 (0.3795)	
$\chi^2 RAMSEY$	0.8217 (0.3996)	

$\chi^2 NORM$ is for normality test, $\chi^2 SERIAL$ for LM serial correlation test, $\chi^2 ARCH$ for autoregressive conditional heteroskedasticity, $\chi^2 WHITE$ for white heteroskedasticity and $\chi^2 REMSAY$ for Resay Reset test.

It is reported by unit root analysis that all the variables are integrated at 1st difference and this analysis lends us to apply Johansen-Juselius, (1990) multivariate cointegration approach. Results are reported in Table-8 which show three (two) cointegrating vectors by Trace test (Maximum Eigen value). It is indicates that the long run relationship exists between the variables over the period of 1980-2010 in case of Pakistan.

Table-8: Results of Johansen Co-integration Test

Hypothesis	Trace Statistic	Maximum Eigen Value
$R = 0$	129.5207*	55.6391*
$R \leq 1$	73.8815*	30.1999***
$R \leq 2$	43.6816**	21.4247
$R \leq 3$	22.2569	16.0203
$R \leq 4$	6.2365	6.2365
Note: *, ** and *** show significant at 1%, 5% and 10% levels respectively.		

The long run results are detailed in Table-9. Our results indicate that female wage has positive impact on female labor supply at 5 percent significance level. All else is same, a 1 percent increase in female wage increases female labor supply by 0.1854 percent. There is positive relationship between foreign remittances and female labor force which is statistically significant at 1 percent level of significance. This shows that foreign remittances seem to increase female labor supply. It is found that a 0.1455 percent increase in female labor supply is linked with foreign remittances by 1 percent, all else is same. Many researchers have studied remittances and taken it as an additional non labor income and hypothesized that the availability of remittances decreases the labor force participation among recipient's household members. Rodriguez and Tiongson (2001) and Funkhouser (1992) estimated data of Manila and Managua and concluded that remittances in fact contract the labor force

participation. Gubert (2002) used the data from Mali, explored that remittances help in the adoption of new technology at the agricultural household level. The author is of the view that remittances act as insurance which reduce the work efforts. The effect of remittances on labor supply for both men and women is negative, which is in line with the traditional assumptions of leisure as a normal good (Emilsson, 2011). However, some authors ended up with other findings like Funkhouser (1992) is of the view that remittances also increase the self-employment along with the contraction in the labor force participation, although both the effects are small. However, our results depict the positive affiliation between female economic activities and foreign remittances due to the fact that Pakistan is in the debt trap along with the vicious circle of poverty. As the poverty is persistent due to high inflation coupled with unemployment, the females are pushed to remain involved and associated in the work force. Our results are in conformity with the findings of Amuedo and Pozo (2005).

The results show that globalization supports female labor supply. The positive impact of globalization on female labor supply is dominant and it is significant at 5 percent level of significance. It is noted that a 1% increase in globalization is 0.5339 percent associated with female labor supply, keeping other factors constant. The negative and statistical significant impact of unemployment rate on female labor supply is found. This indicates that female labor supply depends upon labor market conditions. Keeping all other the same, a 1 percent increase in unemployment will decline female labor supply by 0.0246 percent. According to the theoretical and empirical findings that "Added Worker Effect" is derived from the increase unemployment of the head of the family. The effect of 1 percent unemployment who is the primary worker and mostly the main head of the family compels others family members to seek work who are basically the secondary workers in known as the "Added Worker Effect". Maloney (1986) employed reported data on under employment finds a significant added worker effect. Tano (1993) is of the opinion added workers effect and the discouragement effect are significant and coexist.

We have included squared term of female wage that is $\ln W_t^2$ to investigate monotonic impact of female wage on female labor supply. Our results show that both linear and non-linear terms are statistically significant at 5 percent with negative and positive signs respectively. The coefficients are -2.6889 and 0.1867: it presents the existence of U-shaped

relationship between female wage and female labor supply, which implies that initially female labor supply increases with female wage and then declines after female wage is reached at certain threshold point. In case of Pakistan, Rs 1538 is the turning point in labor market; before which female labor supply decreases with female wage and after which female labor supply increases with female wage.

Table-9: Long Run Results

Dependent Variable = $\ln FP_t$						
Variable	**Coefficient**	**T-Statistic**	**Coefficient**	**T-Statistic**	**Coefficient**	**T-Statistic**
Constant	-2.7729*	-6.8239	8.4461**	2.1007	-2.6513	-0.7004
$\ln W_t$	0.1854**	2.4388	-2.6889**	-2.5369	0.2427**	2.2302
$\ln W_t^2$	…	…	0.1867**	2.7386	…	…
$\ln R_{t-1}$	0.1455*	3.1721	0.0863**	2.2499	0.1516*	4.3371
$\ln G_t$	0.5339**	2.7720	0.5634*	2.9427	0.3096***	1.8443
U_t	-0.0246**	-2.0245	-0.0104	-0.7646	…	…
$\ln P_t$	…	…	…	…	0.0098	0.0201
R-squared	0.9130		0.9313		0.9057	
Adj. R-squared	0.9001		0.9176		0.8911	
F-statistic	68.5879*		67.8670*		62.4324*	
Diagnostic Tests						
Test	**F-Statistic**	**Prob. Value**	**F-Statistic**	**Prob. Value**	**F-Statistic**	**Prob. Value**
$\chi^2 SERIAL$	1.8508	0.1399	1.8667	0.1353	2.6193	0.0417
$\chi^2 ARCH$	0.3024	0.5867	0.1907	0.6656	0.4254	0.5195
$\chi^2 WHITE$	0.6976	0.6900	0.5278	0.8379	0.6424	0.7341
$\chi^2 RAMSEY$	0.9812	0.4382	1.3234	0.2613	0.7285	0.3368
$\chi^2 NORM$ is for normality test, $\chi^2 SERIAL$ for LM serial correlation test, $\chi^2 ARCH$ for autoregressive conditional heteroskedasticity, $\chi^2 WHITE$ for white heteroskedasticity and $\chi^2 REMSAY$ for Resay Reset test.						

Finally, we have investigated the impact of private household consumption on female labor supply. The results are reported in Table-9; they show that private household consumption has positive (negligible) impacts on female labor supply but its impact is statistically insignificant. Long run model seems to pass all diagnostic tests. The diagnostic tests show that no serial correlation is found. The auto-conditional heteroskedasticity does not exist. There is existence of homoscedasticity and model is well specified. This shows that long run model meets the assumptions of classical linear regression model (CLRM).

Table-10: Short Run Results

Dependent Variable = $\Delta \ln FP_t$				
Variable	**Coefficient**	**Std. Error**	**T-Statistic**	**Prob. Value**
Constant	0.0050	0.0104	0.4870	0.6311
$\Delta \ln FP_{t-1}$	0.4289*	0.1355	3.1653	0.0045
$\Delta \ln W_t$	0.0625	0.0786	0.7953	0.4349
$\Delta \ln R_t$	0.1253***	0.0690	1.8144	0.0833
$\Delta \ln G_t$	0.0858	0.2726	0.3146	0.7560
ΔU_t	0.0057	0.0130	0.4390	0.6649
ECM_{t-1}	-0.6013*	0.1310	-4.5873	0.0001
R-squared	0.4104			
Adj. R-squared	0.2496			
Durbin-Watson	2.1165			
F-statistic	2.5530**			
Diagnostic Tests				
Test	**F-Statistic**	**Prob. Value**		
$\chi^2 SERIAL$	0.3080	0.7382		
$\chi^2 ARCH$	0.3149	0.5794		
$\chi^2 WHITE$	0.5420	0.8563		
$\chi^2 RAMSEY$	0.0086	0.9266		
$\chi^2 NORM$ is for normality test, $\chi^2 SERIAL$ for LM serial correlation test, $\chi^2 ARCH$ for autoregressive conditional heteroskedasticity, $\chi^2 WHITE$ for white heteroskedasticity and $\chi^2 REMSAY$ for Resay Reset test.				

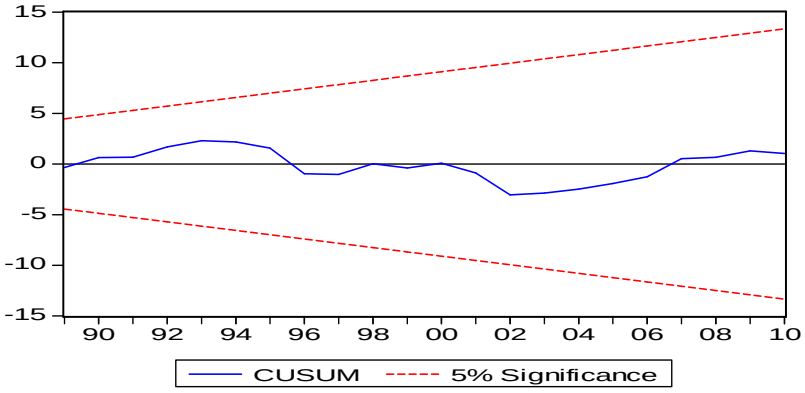
The short run results are noted in Table-10[4]. The results indicate that future female labor supply is determined by female labor supply in current period and it is statistically significant at 1 percent. It is found that a 1 percent female labor supply in current period increases by 0.4289 percent in future period. The effect of female wage on female labor supply is positive and it is insignificant statistically. This implies that female time to decide about their supply of labor following wage rate. There is a positive relationship between foreign remittances and female labor supply and it is statistically significant at 10 percent level of significance. Globalization and unemployment affect female labor supply positively but insignificantly. The statistical significance of estimate of error correction term i.e. ECM_{t-1} indicates the

[4]We have used the lagged of dependent variables as an independent variable to remove the issue of auto-correlation.

speed of adjustment and further confirms our established long run relationship between the series (Banerjee et al. 1993). The speed of adjustment shows that how short run changes converge towards long run stable equilibrium path. Our results indicate that sign of estimate of ECM_{t-1} is -0.6013, which is highly significant at 1 percent level. This corroborates our long run relationship between female labor supply and its determinants and it validates the view by Bannerjee et al. (1998). Our empirical evidence reveals that 60.13 percent deviations are corrected from short run towards long span of time. The coefficient of ECM_{t-1} is -0.6013 showing high speed of adjustment towards long run stable equilibrium path. This indicates that following female labor supply model, Pakistan would take 1 year and 8 months to reach long run stable equilibrium path.

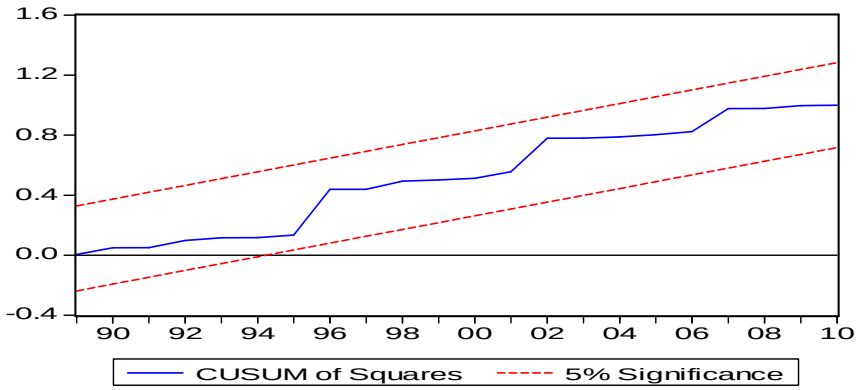
The short run model also passes diagnostic tests following CLRM assumptions. The results show that the variables are not serially correlated with residual term. There is no existence of autoregressive conditional heteroskedasticity. White heteroskedasticity is not found in the short run model. The short run model is well specified. The stability of long run and short run estimates has been tested by applying the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMsq) are applied. It is suggested, by Pesaran and Shin, (1999), to apply these tests. The null hypothesis of both CUSUM and CUSUMsq may be accepted that if plots of both tests are moving between critical limits. The null hypothesis is "regressions equation is correctly specified" (Bahmani-Oskooee and Nasir, 2004).

Figure-1: Plot of Cumulative Sum of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

Figure-2: Plot of Cumulative Sum of Square of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

The CUSUM and CUSUMsq tests show that graphs of both tests do not cross the lower and upper critical limits. So, we can conclude that long-and-short runs estimates are reliable and efficient.

V .The VECM Granger Causality Analysis

It is pointed by Granger, (1969) that the VECM Granger causality should be applied to investigate the causal relationship between the variables if variables are cointegrated for long run relationship and order of integration of series is I(1). The exact detection of causal relationship between the variables would help us in knowing about which factor is causing female labor supply change. Our analysis validated the cointegration between female wage, foreign remittances, globalization, unemployment rate and female labor supply which further leads us to apply the VECM Granger causality to test the existence of causal relationship between said variables. The results of the VECM Granger causality are reported in Table-11. The convergence is high in female labor supply (-0.7418) equation as compared to foreign remittances (-0.5727) equation and unemployment rate (-0.1006) equation respectively.

The results show that in long run, the feedback effect is found between female labor supply and foreign remittances. The bidirectional causality exists between foreign remittances and unemployment rate. Female labor supply and unemployment rate Granger cause each other. Globalization Granger causes female labor supply.

Table-12: The VECM Granger Causality Analysis

Dependent Variable	Direction of Causality										
	Short Run					Long Run	Joint Long-and-Short Run Causality				
	$\Delta\ln FP_{t-1}$	$\Delta\ln W_{t-1}$	$\Delta\ln R_{t-1}$	$\Delta\ln G_{t-1}$	ΔU_{t-1}	ECT_{t-1}	$\Delta\ln FP_{t-1}, ECT_{t-1}$	$\Delta\ln W_{t-1}, ECT_{t-1}$	$\Delta\ln R_{t-1}, ECT_{t-1}$	$\Delta\ln G_{t-1}, ECT_{t-1}$	$\Delta U_{t-1}, ECT_{t-1}$
$\Delta\ln FP_t$	….	3.0446*** [0.0726]	4.2194** [0.0314]	1.0349 [0.3755]	0.1272 [0.8813]	-0.7418* [-4.4980]	….	9.1906* [0.0007]	7.4082* [0.0020]	8.2260* [0.0012]	8.1720* [0.0012]
$\Delta\ln W_t$	0.3722 [0.6941]	….	0.4662 [0.6325]	0.1410 [0.8693]	2.3729 [0.1202]	….	….	….	….	….	….
$\Delta\ln R_t$	4.8871** [0.0202]	1.9787 [0.1672]	….	0.3460 [0.7121]	1.8540 [0.1853]	-0.5727* [-3.0052]	4.1954** [0.0204]	5.6976* [0.0063]	….	3.1460** [0.0506]	3.7091** [0.0308]
$\Delta\ln G_t$	0.0395 [0.9613]	0.3163 [0.7326]	1.4301 [0.2639]	….	0.3364 [0.7185]	….	….	….	….	….	….
ΔU_t	1.2548 [0.3098]	5.7770** [0.0115]	0.8741 [0.4287]	1.8449 [0.1867]	….	-0.1006* [-5.1982]	11.3926* [0.0000]	9.4870* [0.0007]	9.7462* [0.0005]	10.2293* [0.0003]	….

Note: *, ** and *** show significance at 1, 5 and 10 per cent levels respectively.

In short run, the bidirectional causal relationship is found between female labor supply and foreign remittances. The unidirectional causality is running from female wage to female labor supply and unemployment rate.

V. Conclusion and Policy Implications

This study differs with the other studies as it has analyzed the impact of female wages, foreign remittances, globalization and unemployment on female labor supply, which are important indicators of the labor market and help in economic development of Pakistan. The study covers the period of 1980-2010. There is virtually no macroeconomic study that have been done so far in Pakistan which has employed the ARDL bounds testing approach to cointegration along with the VECM Granger causality in the context of the impact of female wages, foreign remittances, globalization, unemployment on female labor supply.

This paper has investigated the impact of female wage, foreign remittances, globalization and unemployment on female labor participation in case of Pakistan. In doing so, traditional unit root tests such as ADF, PP and Ng-Perron and structural break unit root test such as Zivot-Andrews are applied to test the unit root properties of the variables. Long run relationship between female wage, foreign remittances, globalization and unemployment rate and female labor participation is examined by employing the ARDL bounds testing approach to cointegration. Our empirical evidence shows that we have found cointegration between female wage, foreign remittances, globalization, unemployment and female labor supply in case of Pakistan. Results show that female wage encourages female labor supply. Female labor supply is also promoted by globalization. Unemployment is negatively linked with female labor supply. The causality analysis unveils that the feedback hypothesis is found between female labor supply and foreign remittances and same inference is drawn for female labor supply and unemployment and, foreign remittances and unemployment. Globalization and female wage Granger cause female labor supply.

On the basis of this study, some recommendations and policy options are framed which are equally useful for the policy formulators and development planners. The informal sector needs to be formalized so that the conditions of women in this sector will improve. To increase the

employment opportunities of women especially in food-chain activities such as processing, preservation and preparation, the government should build medium-size processing plants that will create area employment in the rural settings on one hand and produce value added products on the other which is the demand of the hour. In the era of globalization, the informal sector needs restructuring by promoting female entrepreneurship in female related professions such as embroidery, stitching, etc which supports "feminization of employment". The government should revive the exports of the country in the fields of garments, leather, jewelry, sports etc. where the role and association of females is dominant. By devising policies that encourage the job prospects for women will help in reducing unemployment in the economy. In the nutshell, an improvement in unemployment rates in the labor market will draw discouraged workers into the labor force. Therefore, measures to decrease unemployment rates and improve labor market conditions will contribute to increasing female labor force participation which ultimately facilitate on economic development of Pakistan. For future research, we augment this paper by investigating the impact of foreign direct investment and financial development on female labor force participation using Pakistani and Indian time series data following Shahbaz and Rahman, (2012). The factors contributing to human resource occupation may also be good topic for research in case of Pakistan (Mathew, 2012).

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